REMARKS

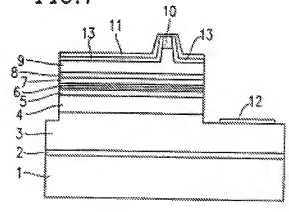
Claims 1-3 and 5-17 are pending in the application. Claims 3, 7-14 and 17 have been withdrawn from consideration. Claim 4 has been canceled. Favorable reconsideration of the application is respectfully requested.

I. REJECTION OF CLAIMS UNDER 35 U.S.C. §102(b)

Claims 1, 2, 5, 6, 15 and 16 have been rejected under 35 U.S.C. §102(b) as being anticipated by Okumura (U.S. Patent No. 6,456,640).

Applicants respectfully traverse the rejection for at least the following reasons. Okumura fails to disclose all of the recited features of the claimed semiconductor device. Okumura (see Fig. 1 below) discloses a gallium nitride type semiconductor laser device that includes a substrate (1), a GaN buffer layer (2), an n-GaN n-type contact layer (3), an n-$Al_{0.1}Ga_{0.9}N$ n-type cladding layer (4), an n-GaN guide layer (5), an MQW structure active layer (6), an $Al_{0.2}Ga_{0.8}N$ evaporation prevention layer (7), a p-GaN guide layer (8), a p-$Al_{0.1}Ga_{0.9}N$ p-type cladding layer (9), a p-GaN p-type contact layer (10), a p-side electrode (11), an n-side electrode (12) and a SiO_2 insulation film (13).

FIG. 1



Okumura

The Examiner associates the different layers of the semiconductor device of Okumura with the claimed semiconductor device as indicated in the following table.

Examiner's position re Okumura	Claimed feature
Cladding layer 9	2nd p-type nitride semiconductor layer containing Mg
Guide layer 8: "and comprising an Mg/p-doped AlGaN guide layer (corresponding to the recited p-doped first nitride layer) formed on, and in contact with, the undoped AlGaN guide layer"	1st p-type semiconductor layer containing Al and Mg
Guide layer 8: "an AlGaN light guide layer 8 comprising an undoped AlGaN guide layer (corresponding to the nondoped nitride layer) formed on and in contact with the undoped GaN layer"	Non-doped nitride layer in contact with 1st p-type semiconductor layer
Evaporation layer 7 formed on MQW	Non-doped GaN layer in contact with non-doped nitride layer
Active layer 6	Active layer having plurality of GaInN layers and no intentional doped impurity

Thus it appears that the Examiner is using the guide layer 8 of Okumura to meet the claim limitations of both the 1st p-type semiconductor layer containing Al and Mg and the non-doped nitride layer in contact with the 1st p-type semiconductor layer. Applicants respectfully submit that there is no support in the disclosure of Okumura for the Examiner's position. Guide layer 8 is described in Okumura at column 8, lines 21-38:

> Each of the guide layers 5 and 8 need not be made of GaN but may alternatively be made of any other material, e.g., an InGaN or AlGaN ternary mixed crystal, an InGaAlN quaternary mixed crystal, or the like, as long as the material has an energy gap value between that of the quantum well layer forming the multiquantum well structure active layer 6 and that of the cladding layers 4 and 9. Moreover, a donor or an acceptor need not be doped entirely across the guide layers. Alternatively, a portion of the guide layers closer to the multiquantum well structure active layer 6 may be non-doped, or the entire guide layers may be non-doped. In such a case, fewer carriers exist in the guide layers, thereby reducing the amount of light absorbed by free carriers and allowing for further reduction of the oscillation threshold current. Furthermore, the guide layer may be optional in some cases, and a gallium nitride type semiconductor laser device without guide layers may still function as a semiconductor laser device.

With regard to the active layer 6, Okumura discloses that the active layer 6 contains two $In_{0.2}Ga_{0.8}N$ quantum well layers and a single $In_{0.05}Ga_{0.95}N$ barrier layer, and that "each of the quantum well layer and the barrier layer may be made of a quaternary

mixed crystal semiconductor, or a mixed crystal semiconductor of more than four elements which further contains one or more additional elements in a small amount in addition to the INGaN ternary mixed crystal." [Col. 8, lines 39-52]. Thus Okumura does not teach an active layer having a plurality of GaInN layers and no intentional doped impurity.

Because Okumura fails to teach all of the recited layers of the claimed nitride semiconductor device, the rejection under 35 U.S.C. §102(b) should be withdrawn.

II. REJECTION OF CLAIMS UNDER 35 U.S.C. §103(a)

The Examiner has also rejected claims 1, 2, 5, 6, 15 and 16 under 35 U.S.C. §103(a) as being unpatentable over Okumura in view of Maeda et al. (U.S. Patent No. 6,468,821). The Examiner states that, for the sake of argument only, if Okumura is determined not to explicitly disclose an active layer comprising undoped InGaN layers, then the Examiner notes that the art well recognizes this feature is suitable for light emitting diodes. The Examiner relies on Maeda et al. for the teaching that undoped InGaN wells are suitable for MQW active layers in nitride light emitting devices.

Applicants respectfully traverse the rejection for at least the following reasons. As discussed above, Okumura fails to teach a nitride semiconductor device that includes a p-type nitride semiconductor layer, an n-type nitride semiconductor layer, an active layer interposed between the p-type nitride semiconductor layer and the n-type nitride semiconductor layer, a non-doped nitride semiconductor layer containing Al, and a non-doped GaN layer, wherein the p-type nitride semiconductor layer includes: a first p-type nitride semiconductor layer containing Al and Mg; and a second p-type nitride semiconductor layer containing Mg. The first p-type nitride semiconductor layer being located between the active layer and the second p-type nitride semiconductor layer, wherein the first p-type nitride semiconductor layer is in contact with the second p-type nitride semiconductor layer. The non-doped nitride semiconductor layer is located between the first p-type nitride semiconductor layer and the active layer, and is in contact with the first p-type nitride semiconductor layer. The non-doped GaN layer is located between the non-doped nitride semiconductor layer and the active layer and is in contact

with the non-doped nitride semiconductor layer. In view of the shortcomings of the disclosure of Okumura, even if one skilled in the art were motivated to modify the device of Okumura based on the teachings of Maeda et al. to include undoped InGaN wells, the combined teachings Okumura and Maeda et al. would not include all of the recited features of the claimed semiconductor device. Accordingly, prima facie obviousness has not been established and the rejection under 35 U.S.C. §103(a) should be withdrawn.

The Examiner has also rejected claim 2 under 35 U.S.C. §103(a) as being unpatentable over Okumura in view of Kubota (Japanese Patent No. 2000-151023). The Examiner states that, for the sake of argument only, if cladding layer 9 is determined not to function as a barrier for suppressing carrier overflow, then the Examiner notes that the art well recognized this feature is suitable for light emitting diodes. It is the Examiner's position that it would have been obvious to have modified the cladding layer Okumura discloses so that it is highly p-doped, so that it functions as a barrier to suppress carrier overflow from the active layer, as taught by Kubota.

Applicants respectfully traverse the rejection for at least the following reasons. In view of the shortcomings of the disclosure of Okumura discussed above, even if one skilled in the art were motivated to modify the cladding layer of Okumura based on the teachings of Kubota, the combined teachings Okumura and Kubota would not include all of the recited features of the claimed semiconductor device. Accordingly, prima facie obviousness has not been established and the rejection under 35 U.S.C. §103(a) should be withdrawn.

III. CONCLUSION

Claims 1, 2, 5, 6, 15 and 16 are believed to be allowable and the application is believed to be in condition for allowance. A prompt action to such end is earnestly solicited.

Should the Examiner feel that a telephone interview would be helpful to facilitate favorable prosecution of the above-identified application, the Examiner is invited to contact the undersigned at the telephone number provided below.

Should a petition for an extension of time be necessary for the timely reply to the outstanding Office Action (or if such a petition has been made and an additional extension is necessary), petition is hereby made and the Commissioner is authorized to charge any fees (including additional claim fees) to Deposit Account No. 18-0988.

Respectfully submitted,

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